

TOOL FOR QUICK REMOVAL AND INSTALATION OF DRAIN

### BACKGROUND OF THE INVENTION

#### FIELD OF THE INVENTION

This invention relates to the art of removably attaching at least the retaining ring for a drain fixture and more particularly providing quick on and off attachment of the retaining ring for an instant set shower drain by means of a tool arrangement that is configured to provide a mechanical advantage to allow the removal of the interior nut threaded onto a mating thread on the drain fixture fitted to the opening of a shower pan leading to the drain pipe. With the mechanical advantage the tool arrangement, the retaining ring may be removed even if the peripheral edge of the drain fixture has been sealed or the retaining ring has been in placed for a number of years. This application is based upon the Provisional Patent filed 06/24/2002 as Serial Number 60/390,548.

#### Description of the Prior Art

The art of installing and removing retaining rings has a long history and many variations. Sealing of a drainpipe to the opening in a shower pan to allow the draining of water without leakage around the perimeter of the drainpipe is critical. If the seal is not water tight, some additional calking or sealing may be necessary to prevent water damage. Settling of the supports for the drainpipe or shifting of the alignment of the drainpipe especially if a building is subjected to severe weather or earthquake may cause connections to leak and require corrective maintenance of the connection. The teaching herein is of a tool arrangement removably inserted inside the retaining ring, said tool arrangement providing a mechanical advantage to evenly apply torque to the retaining ring and may also be used for the insertable removal and sealing of other drain hole openings to drain pipes for other than shower pan devices such as sinks.

1 Disengagement and reengagement of the retaining  
2 ring is the initial step required to install and maintain  
3 the drain fixture and establish waterproof drain function.  
4 A plurality of channels are formed in the internal  
5 perimeter of the retaining ring to allow turning of the  
6 retaining ring for removal or installation. Some drain  
7 fixture manufacturers utilize only two channels; others  
8 utilize four, eight or sixteen.

9 Currently there are many different configurations  
10 of a drain hole in a shower pan or sink that requires  
11 connection to a drainpipe. A generally standard drain  
12 fixture provides an interface between the drain hole and  
13 the drainpipe.

14 A drain fixture is generally a combination of  
15 elements configured to provide a peripherally sealed  
16 mounting of the drain fixture in the drain hole of the  
17 shower or sink on one end and an internally sealed  
18 connection to a drainpipe on the other end to provide for  
19 egress of drain water without leakage.

20 Each time the user wishes to remove or perform  
21 maintenance on the connection between the drain hole and  
22 the drainpipe as well as upon initial installation, the  
23 retaining ring must be removed and then reinstalled. If  
24 the prior installation was not sealed properly, the leak  
25 may be corrected by additional sealant or external calking  
26 or if the retaining ring has been in place for some  
27 extended time the retaining ring may simply develop  
28 corrosion of the threads on the retaining ring and may  
29 contribute to difficulty in removal of the retaining ring.

30 The current art teaches the use of a drain  
31 fixture manufacture's supplied tool to span the drain  
32 opening by insertion of the tips of a manufacturer's  
33 supplied tool into opposing channels around the inside  
34 perimeter of the retaining ring. The tool is fabricated  
35 with a central slot into which another tool such as a  
36 screwdriver may be inserted. A screwdriver does not

1 provide a large mechanical advantage to create torque to be  
2 applied through the manufacturer's tool tips to the  
3 retaining ring. As the manufacturer's tool has no  
4 restraining mechanism between it and the tool inserted  
5 therein, the manufacturer's tool may become dislodged from  
6 the channels in the retaining ring and simply fall into the  
7 drain. When the drainpipe is deep, it is sometimes  
8 difficult to locate and retrieve the manufacture's tool.

9 Further, the manufacture's tool is provided as a  
10 throw away piece and is usually stamped out of thin sheet  
11 stock that is incapable of sustaining the large torque  
12 force sometimes required to overcome the seal between the  
13 retaining ring and the drain pipe fixture. The tool  
14 becomes deformed and useless. Additional work and  
15 sometimes-destructive removal of the retaining ring may  
16 become necessary. Should the destructive removal of the  
17 retaining ring encompass the drain pipe fixture thread or  
18 involve the enlargement of the hole in the pan, further  
19 maintenance with adaptors, sealing, replacement of fixtures  
20 may be necessary to complete the installation or  
21 maintenance procedure all to the detriment of the user.

22 Direct, evenly distributed torque pressure is  
23 most effective to force the retaining ring to unscrew from  
24 the drain pipe fixture threads and screw back on to  
25 establish the seal between the drain pipe fixture and the  
26 drainpipe.

27 Thus, there has long been a need for a tool  
28 arrangement that allows the user to easily engage and  
29 disengage the internal channels of a retaining ring and  
30 thereafter apply sufficient torque to overcome a prior  
31 sealing of the retaining ring to the drain fixture or apply  
32 sufficient force to tighten the retaining ring into the  
33 drain fixture to seal the connection with the drainpipe.

34 It is desired that the tool arrangement allow  
35 easy generation of sufficient torque and adjustment of the

1 seal to accommodate the user's drain and pan material  
2 without deforming either and thereby creating a leak.

3 It is further desired that the tool arrangement  
4 be of sufficient size as to not readily fall into the drain  
5 especially after disengagement or reengagement of the tool  
6 arrangement with the retaining ring.

7 It is further desired that the arrangement be  
8 able to remove the retaining ring without deformity so that  
9 the retaining ring may be reused to seal the drain hole  
10 fixture to the drainpipe. It is preferred that the  
11 engagement or disengagement of the retaining ring be  
12 accomplished, without requiring great strength on the part  
13 of the user.

14 It is further desired that the arrangement allow  
15 disengagement of the retaining ring even though the drain  
16 fixture is adversely affected by a build up of sealant,  
17 corrosion or water or soap residue deposits.

18 It is further desired that the engagement not  
19 require strong, uneven pressure that would deform the drain  
20 or surrounding pan material upon which the drain fixture is  
21 mounted.

22 It is desired that a simple engagement of the  
23 insert tool fabricated according to the teaching of this  
24 invention be engageable with selected user's existing tools  
25 such as the lever of a socket wrench set with a latching or  
26 unlatching movement to engage and disengage the insert tool  
27 securely to the lever to prevent the separation of the tool  
28 arrangement.

29 It is desired that this engagement of a lever  
30 with the insert tool provide an arrangement whereby  
31 sufficient, evenly distributed torque to disengage the  
32 retaining ring without deformity to the retaining ring or  
33 drain fixture may be applied.

34 It is further desired that the insert tool be  
35 insertable into major manufacturer's retaining rings

1 without requiring any special connector to be mounted to  
2 the insert tool or retaining ring.

### 3 SUMMARY OF THE INVENTION

4 Accordingly, it is an object of the present  
5 invention to provide a quick assembly of a tool  
6 arrangement, engagement of the tool arrangement with the  
7 retaining ring, application of torque by the user and  
8 release of any seal of the retaining ring from the drain  
9 fixture without deformity to the insert tool or the  
10 retaining ring.

11 It is an object of the present invention to  
12 provide an improved tool arrangement that allows the user  
13 to remove the retaining ring, replace any internal seals or  
14 grommets and reinstall the retaining ring in a watertight  
15 configuration and thereafter not require any adjustment to  
16 the tension on the retaining ring even after application of  
17 hot water and years of use.

18 It is another object of the present invention to  
19 provide a method of engagement and disengagement of the  
20 retaining ring from the drain fixture by application of  
21 sufficient, evenly applied torque to overcome the seal but  
22 not deform the parts.

23 It is yet another object of the present invention  
24 to provide a disengagement and engagement arrangement which  
25 is not adversely affected by a build up of corrosion or  
26 deposits and be used without strong pressure which may  
27 strip the threads or deform the surrounding material. The  
28 insert tool should incorporate an arrangement for  
29 connection to other tools whereby a mechanical advantage to  
30 remove and reinstall the retaining ring with pressure in an  
31 acceptable range.

32 It is yet another object of the present invention  
33 to be easily mountable into any "standard retaining ring"  
34 and accept standard tools as which may be currently owned  
35 by the user as levers to provide torque to the tool

1 arrangement to remove the retaining ring from the drain  
2 fixture.

3 The above and other objects of the present  
4 invention are achieved, according to a preferred embodiment  
5 thereof, by providing an improved insert tool mountable to  
6 engage to internal channels of the retaining ring without  
7 disengagement of the insert tool from the channels and loss  
8 of the insert tool down the drain. Upon release of the  
9 retaining ring from the drain fixture, the retaining ring  
10 may be re-positioned for reengagement with the drain  
11 fixture.

12 In the preferred embodiment, the insert tool is  
13 fabricated of a central body with peripheral extending  
14 spokes to span the drain, said spokes positioned to be  
15 engageable within the internal channels of the retaining  
16 ring mounted to one end of the drain pipe fixture. The  
17 central body including an opening engageable by a lever to  
18 assemble a tool arrangement whereby said tool arrangement  
19 may be used with increased mechanical advantage to apply  
20 torque to the retaining ring for removal of the retaining  
21 ring even under the condition of the retaining ring being  
22 sealed to the drain pipe fixture by corrosion, deposits or  
23 calking without requiring any special adaptors or extra  
24 ordinary strength on the part of the user.

#### 25 BRIEF DESCRIPTION OF THE DRAWINGS

26 The above and other embodiments of the present  
27 invention may be more fully understood from the following  
28 detailed description, taken together with the accompanying  
29 drawings, wherein similar reference characters refer to  
30 similar elements throughout, and in which:

31 Figure 1 is a perspective view of the insert tool  
32 embodying the present invention;

33 Figure 1a is a perspective view of the drain  
34 manufacturer's supplied throwaway tool;

35 Figure 2 is a cross-sectional view of the insert  
36 tool depicted in Fig. 1 taking along line 2-2 thereof;

1           Figure 3 is a top view of a shower drain fixture  
2 and the insert tool illustrated in Figure 1 positioned  
3 therein; and,

4           Figure 4 is a view of the shower drain fixture  
5 shown in Figure 3 taken along line 4-4 thereof.

6           DESCRIPTION OF A PREFERRED EMBODIMENT

7           Drains for showers or sinks provide an egress for  
8 water to be conveyed from the shower or sink fixture to a  
9 sewer, and include a sealing mechanism through an opening  
10 in the bottom of the shower pan or sink for permitting the  
11 opening to be coupled and sealed to a drainpipe. The seal  
12 conventionally comprises a drain fitting clamped to the pan  
13 or sink opening by an exterior locking nut and sealing a  
14 washer/gasket arrangement between one end of the drain  
15 fitting and the pan. The drainpipe is inserted into and  
16 within the other end of the drain fitting. A grommet is  
17 placed about the end of the drainpipe and pressure is  
18 applied to the grommet by tightening an internal nut to  
19 seal the connection between the drainpipe and the interior  
20 of the drain fixture. The interior nut is threaded into a  
21 mating thread on the interior of the drain fixture in  
22 contact with the grommet. Threading of the interior nut  
23 into the drain fitting enables the interior nut to press  
24 against the grommet and cause the grommet to be squeezed  
25 against the drain pipe and the drain fitting, thereby  
26 assuring a tight, water sealing connection between the  
27 drain pipe and the drain fitting.

28           The interior nut is provided with a plurality of  
29 channels placed about its interior circumferential edge.  
30 Upon engagement of the interior nut with the pipe fixture,  
31 these channels enable a user to place the insert tool that  
32 is the subject of this invention within the channels of the  
33 interior nut for the final tightening of the interior nut  
34 against the grommet. Removal of the interior nut is  
35 conducted in a similar manner. Over the period of use of  
36 the drain fixture by minerals and other matter washed into

1 the drainpipe with the drain water. Such cementing resists  
2 the removal of the interior nut and creates a maintenance  
3 problem.

4 Referring now to the drawing, FIG. 1 shows the  
5 insert tool, generally designated 10, fabricated according  
6 to the invention of a central body 11, generally circularly  
7 in shape and fabricated of stock of sufficient thickness to  
8 be engageable by the handle of a common socket wrench set  
9 to be used as a lever. In the preferred embodiment, the  
10 insert tool 10 is fabricated of at least  $\frac{1}{4}$  inch thick  
11 aluminum sheet stock. The insert tool 10 is fabricated  
12 with a preselected number of spokes 12 positioned on the  
13 outside circumferential edge of the central body 11. The  
14 preferred number of spokes 12 is at least two but four or  
15 even eight spokes 12 may be used in some configurations.  
16 First wall 14 is positioned generally at the hub of the  
17 central body 11 to provide a non-circular opening for the  
18 insertion of a lever. The user-supplied lever may be the  
19 handle of a socket wrench set. The shaft extending from  
20 the socket wrench handle upon which sockets are mounted may  
21 be inserted into the first wall 14 and may contain a  
22 detainer means to secure the shaft to the insert tool 10 to  
23 prevent inadvertent separation of the insert tool from the  
24 lever and dropping of the insert tool 10 into the drain.  
25 In the preferred embodiment, the overall dimensions of the  
26 central body 11 and extended spokes 12 is selected to  
27 prevent the insert tool 10 from passing through the drain  
28 fixture and into the drainpipe.

29 Not shown in the drawing is the fabrication of a  
30 plurality of first walls 14 positioned generally on  
31 opposite sides of the hub of the central body 11 and of a  
32 size to accommodate a multi-pronged tool such as the open  
33 jaws of adjustable pliers that may be used to provide a  
34 lever to apply torque to the central body 11 after  
35 insertion of the jaws of the pliers into said first walls  
36 14. A configuration of three first walls 14 may be used to

1 provide a more even torque without slippage between the  
2 lever and the insert tool 10. This configuration may be  
3 useful to perform extended maintenance that may be required  
4 to reseal multiple drains should a large building be  
5 subjected to severe weather or earthquake that shifted the  
6 drainpipes.

7         The overall function of the invention herein is  
8 best understood from Figures 3 and 4. The drain fixture,  
9 generally designated 16, is disposed to be secured within a  
10 hole formed in the bottom of a shower or sink as  
11 represented by the shower pan floor 18. The drain fixture  
12 16 includes a fitting generally designated 24 having a  
13 cylindrical portion 26, an outwardly extending peripheral  
14 lip 28 at the top end of the cylindrical portion 26 and an  
15 inwardly extending peripheral lip 29 at the bottom end of  
16 the cylindrical portion 26. The cylindrical portion 26 is  
17 sized to permit the drain fitting to be inserted through  
18 the opening in the pan floor 18 formed by second wall 20  
19 allowing lip 28 to rest atop the pan floor 18.

20         The cylindrical portion 26 of the fitting 24 is  
21 provided with an external thread 30 and an internal thread  
22 32.

23         A gasket 38 and washer 36 is applied to the top  
24 of an external nut 34 that is threaded onto external thread  
25 30 whereby tightening of the external nut 34 presses the  
26 gasket 36 and washer against to the underside of the pan  
27 floor 18 thereby securing the pan floor 18 between the  
28 outwardly extending peripheral lip 28 and the external nut  
29 34, the gasket 38 and washer 36 providing a waterproof seal  
30 there between.

31         An internal nut 40 is engageable with the  
32 internal thread 32.

33         A grommet 42 of sealing material such as rubber  
34 or the like is fabricated to be placed within the lower  
35 part of the cylindrical portion 26 and held in place by the  
36 inwardly extending lip 29 thereby positioned to be in

1 contact with the inside of the cylindrical portion 26 and  
2 the outside wall of a drain pipe 22. Tightening of the  
3 internal nut 40 into the drain fitting 24 presses the  
4 grommet 42 firmly against the cylindrical portion 26 and  
5 the drainpipe 22 to affect a waterproof seal there between.

6 Internal nut 40 is fabricated with a plurality of  
7 channels 44 formed in its internal circumferential edge at  
8 preselected intervals whereby the spokes 12 attached to the  
9 central body 11 of the insert tool are engageable with at  
10 least two spaced apart channels 44 upon the insertion of  
11 the insert tool 10 within the internal nut 40. Thereafter,  
12 a lever may be inserted into first walls 14 and the  
13 arrangement of the insert tool 10 and lever may be used to  
14 apply torque under a mechanical advantage to the internal  
15 nut 40 in order to tighten the internal nut 40 into the  
16 cylindrical wall 26. The snugness of the internal nut 40  
17 into the cylindrical wall 26 should be sufficient to deform  
18 the grommet 42 and provide a waterproof connection between  
19 the cylindrical portion 26 and the drain 22 without  
20 deforming the internal nut 40 or the cylindrical portion 26  
21 there after said insert 10 may be disengaged from said  
22 internal nut 40 thereby providing a clear drain path.

23 To remove the internal nut 40 from the  
24 cylindrical portion 26, the insert 10 is positioned to  
25 engage the spokes 12 with the channels 44, a lever is  
26 engaged with first wall 14 and torque sufficient to unscrew  
27 the internal nut 40 is applied.

28 In the prior art, the user may have had extreme  
29 difficulty to release the internal nut 40 from the  
30 cylindrical portion 26. The insert 10, fabricated  
31 according to the teaching of this invention upon assembly  
32 with a lever, allows the user to easily generate and apply  
33 sufficient, even torque to unscrew the internal nut 40 even  
34 if deposits, calking or corrosion has partially sealed the  
35 internal nut 40 to the cylindrical portion 26 all without

1 deforming the insert 10, the internal nut 40 or the  
2 cylindrical portion 26.

3           Figure 1a illustrates the prior art of a throw  
4 away tool generally designated 101 provided by the drain  
5 fixture manufacturer of the instant set shower drain  
6 arrangement. The tool 101 is provided with wall 14a  
7 generally shaped to accept a screwdriver blade. The remote  
8 ends of the tool 101 terminate with spokes 12a shaped to  
9 engage opposing channels 44 of the internal nut 40 of the  
10 manufacturer's product. Because the tool 101 is provided  
11 merely as a convenience by the manufacturer and intended to  
12 be disposable, the tool 101 is generally stamped from thin  
13 sheet stock that lacks strength to withstand the intense  
14 torque sometimes required to disengage the internal nut 40  
15 from the cylindrical portion 26. Further, the shape of  
16 wall 14a to accommodate a screwdriver place is insufficient  
17 to allow the user to insert an adequate lever into wall 14a  
18 and generate torque. Further, the lack of sufficient  
19 thickness of wall 14a to sufficiently engage the inserted  
20 lever allows the tool 101 to easily become dislodged from  
21 the lever and drop down the drain 22. Finally, the  
22 application of torque by only two opposing channels of the  
23 internal nut 40 may be inadequate to provide the even  
24 torque required to remove or tighten the internal nut 40  
25 without deforming the drain fixture 24 or the internal nut  
26 40.

27           In the preferred embodiment, four spokes 12 are  
28 mounted on the central body 11 to provide evenly applied  
29 torque to the internal nut 40.

30           For multiple drain installation or maintenance in  
31 a large building, the insert tool may be fabricated with  
32 more than four spikes 12, placement of first walls 14 in a  
33 spaced apart configuration and a lever configured to engage  
34 said first walls 14 for ease of use.

35           Since certain change may be made in the above  
36 apparatus without departing from the scope of the invention

1 herein involved, it is intended that all matter contained  
2 in the above description, as shown in the accompanying  
3 drawing, shall be interpreted in an illustrative, and not a  
4 limiting sense.